

## ORIGINAL ARTICLE

# The Effects of a Weight Loss Program Focusing on Maternal Education on Childhood Obesity

Hyun-Sook Kang<sup>1</sup>, RN, MPH, PhD, Myoung-Hae Ryu<sup>2</sup>, MSN, RN,  
Sunhee Park<sup>1\*</sup>, RN, MPH, PhD

<sup>1</sup>College of Nursing Science, Kyunghee University, Seoul, Korea

<sup>2</sup>Inchoen Wha Jeon Elementary School, Incheon, Korea

**Purpose** Childhood obesity is a matter of great concern because of its negative health and social consequences. We examined the effect of a weight control program focusing on maternal education on childhood obesity, given that the incidence of obesity is greatly affected by parents.

**Methods** A two-group pre-test/post-test design was used. Participants consisted of 65 obese children and their mothers. The children were fourth- to sixth-grade elementary students who did not currently receive any therapy for weight loss. The children and their mothers were randomly assigned to either an experimental ( $n = 32$ ) or a control group ( $n = 33$ ). The 8-week intervention for mothers included one-time group education, three-time phone counseling, and four-time fliers regarding obesity management. Four outcomes (self-control, obesity index, abdominal circumference, and body fat percentage) were measured before and after the intervention. Chi-squared test or  $t$  test was used to test homogeneity between the two groups. Analysis of covariance was used to test the intervention effects.

**Results** After the intervention was completed, the level of self-control was significantly heightened and obesity levels in the other three outcomes were greatly lowered in the experimental group when compared with the control group.

**Conclusion** Due to strong maternal effects on children's weight control, mothers' active participation must be encouraged in order to resolve childhood obesity. [*Asian Nursing Research* 2008;2(3):150–158]

**Key Words** children, mothers, obesity, weight loss

## INTRODUCTION

The prevalence of obesity in Korea has been on the rise in recent years. Obesity in any age group is a great concern due to health problems caused by obesity. However, obesity in childhood and adolescence is of particular concern because during these

developmental stages, growth spurts take place and the number of fat cells sharply increases (Pietrobelli et al., 1998). According to a survey conducted by the Korea Food and Drug Administration (2005), obesity rates among males aged 6–17 years have soared from 2% in 1981 to 20% in 2004. Obese female children and adolescents accounted for 12%



\*Correspondence to: Sunhee Park, RN, MPH, PhD, College of Nursing Science, Kyunghee University, 1 Hoegi-dong, Dongdaemun-gu, Seoul, 130-071, Korea.  
E-mail: spark@khu.ac.kr

Received: May 23, 2008 Revised: May 29, 2008 Accepted: August 29, 2008

of the total population in 2004. In 2006, approximately 12% of school-aged children and adolescents were obese (Ministry of Education, Science and Technology, 2007).

Researchers suggest two problems relating to childhood obesity. First, 70–80% of obese children are more likely to remain corpulent in adulthood (Rossner, 2001). Second, physical and psychological problems related to obesity in childhood are worse than those in adulthood. Physical health problems include hypertension, diabetes, hyperlipidemia, arteriosclerosis, and fatty liver. Psychological problems include decreased learning abilities and downgraded physical performance. Due to these negative experiences, children are highly likely to lose their self-esteem, feel depressed and anxious, and have problems with identity formation (Ahn & Park, 2004; Berk, 2000; Doak, Visscher, Renders, & Seidell, 2006).

Thus, it is critical to prevent children from becoming obese and to help them maintain a normal weight. To do so, a certain level of self-control among children is required in terms of four aspects: (a) weight control; (b) intake of optimal nutrition for growth; (c) eating habits; and (d) exercise habits. However, in reality, it is not easy for children to have self-control in the aforementioned aspects, and they need parental assistance. Particularly, parents play a pivotal role in managing children's weight, because parents' eating habits and beliefs toward health directly influence their children's weights (Epstein, Wing, & Voloski, 1985). Hence, before children form their eating habits, it is necessary to implement intervention strategies targeting parents so that children can maintain a normal weight (Kim, 2003).

Despite the significant role of parents in children's weight control, the main influence of parents on their children's weight loss has not been tested. Although several empirical studies provided interventions to parents, they have mainly explored the effects of interventions targeting children on their weight loss (Joo, 1998; Kim & Kim, 1996; Lee, 2004; Sahota et al., 2001; Yoo, Lee, & Lee, 1998). Hence, this study developed an intervention program focusing on mothers of obese children and explored its effect on obese

children's weight management. More specifically, the effects of maternal education on obese children's self-control behavior and three obesity-related outcomes (obesity index, abdominal circumference, body fat percentage) were explored.

## METHODS

### *Research design and sampling*

A two-group pre-test/post-test design was used. The fourth- to sixth-grade students at one elementary school located in Incheon were chosen as the target population. This age group was selected because at this stage children have the greatest risk of being obese due to physical growth spurts and an increasing number of fat cells (Pietrobelli et al., 1998).

On the basis of weights measured in the 2006 health examination, obese students were chosen as participants. From a total of 798 fourth- to sixth-grade students, 110 students were selected whose weight was  $\geq 20\%$  higher than normal. The Korean Child Growth Standard (KCGS) was utilized as a criterion for selecting a sample. The KCGS classifies those whose weight is 20–30% higher than normal as mildly obese, those whose weight is 30–50% higher than normal as moderately obese, and those whose weight is 50% above normal as severely obese (The Korean Pediatric Association, 2002). A flier containing study purpose and the intervention program was sent to the parents of children selected for the study. Written informed consent was obtained from all children and their mothers who wanted to take part in this study and who met the two inclusion criteria ( $n=65$ ). The first criterion was no experience of receiving therapy to lose weight (e.g., exercise and diet). This was necessary to prevent any influences of extraneous factors on the study. The second criterion was the understanding of the study purpose. In this process, there were two issues to note. First, the participants were informed that there was no risk of harm to human subjects. Second, the participants in the control group were promised that the same intervention program would be provided to them after the study was completed.

The 65 participants were randomly assigned to either the experimental or the control group by flipping a coin. There were 32 subjects in the experimental group and 33 subjects in the control group. According to Cohen's formula (1988), an adequate sample size for each group was 26 at  $\alpha = .05$ , effect size = .35, and power = .7. On the basis of the sample size calculation, the number of participants in this study was large enough to examine intervention effects.

### **Study procedures**

This study was conducted from September to December, 2006. The detailed processes included selection of the participants (2 weeks), a pre-test (1 week), intervention (8 weeks), and a post-test (1 week). To obtain unbiased results, the following attempts were made. First, the investigators in this study served as intervention providers but did not serve as evaluators of the program. This was done to avoid any influences on the outcomes. Second, five research assistants whose major was nursing served as evaluators and measured the outcome variables. Lastly, mothers in the experimental group were instructed not to share the interventions that they had received with counterparts in the control group until the study was completed.

### **Pre-test**

In the experimental and control groups, obese children's self-control behavior, height, weight, obesity index, abdominal circumference, and body fat percentage were measured. To improve the accuracy of measurements, the following steps were taken. First, the five assistants took part in a training session to learn how to make precise measurements. Second, each assistant took responsibility for exclusively gauging one of the five measures. For instance, the first assistant measured weights of the entire sample in both the pre- and post-test. Thus, bias, which can be caused by differences among evaluators, was prevented. Third, instead of using a single measurement, we measured each outcome three times and used the average of these measurements in our analysis.

Additionally, mothers in the two groups provided information on breastfeeding history and their own occupation. Parental obesity was determined based on body mass index (BMI), which was calculated from heights and weights.

### **Intervention**

Following the suggestions of the National Health Insurance Corporation (Lee & Park, 2006), we developed a weight control program. One nursing professor whose expertise is childhood obesity reviewed the study protocol to check the content validity (Table 1). This program was provided for 8 weeks. The duration of the intervention program was determined based on previous studies by Jeon (2003) and Lee (2004). The intervention was given to two groups, a group of children and a group of mothers. One notable issue was that the intervention for mothers was given only to the experimental group, while the intervention for children was given to the control group and the experimental group. This was done because the main interest of this study was maternal effects on children's weight control.

The intervention provided to mothers in the experimental group was as follows. First, one-time group education on the causes and management of obesity was provided. Second, a flier containing information about childhood obesity, food and exercise therapies, and behavior modification was sent to the mothers four times. Third, phone counseling was provided three times. For mothers in the control group, no intervention was provided. Instead, this group was informed that the same intervention would be provided after the completion of the study.

Interventions given to the children were as follows. First, 1-hour group education was carried out once. This education program included information on exercise, eating habits, behavior modification, and the causes and negative consequences of obesity. Second, the children were instructed to keep a record of their diet and exercise during the intervention period. Third, the children watched a 34-minute video on healthy weight control that was developed by the Ministry for Health, Welfare and Family Affairs in South Korea.

**Table 1***Intervention Protocol*

Intervention recipients	Intervention contents	Frequency/8 weeks	Used materials
Mother	<ol style="list-style-type: none"> <li>One-hour group education using PowerPoint slides <ul style="list-style-type: none"> <li>Current situations of CO</li> <li>Reasons why CO must be treated</li> <li>Diagnosis and management relative to CO</li> <li>Parental roles in their children's weight control</li> <li>Diet, exercise, and behavior modification</li> </ul> </li> <li>Phone counseling (2nd, 4th, and 6th weeks) <ul style="list-style-type: none"> <li>Management and education relative to their children's obesity</li> </ul> </li> <li>Flier (1st, 3rd, 5th, and 7th weeks) <ul style="list-style-type: none"> <li>CO</li> <li>Appropriate diet</li> <li>Exercise</li> <li>Behavior modification</li> </ul> </li> </ol>	<p>Once</p> <p>3 times</p> <p>4 times</p>	<ol style="list-style-type: none"> <li>Obesity guidelines for parents</li> <li>Food calories list</li> <li>Significance of having breakfast</li> </ol>
Obese child	<ol style="list-style-type: none"> <li>One-hour group education using PowerPoint slides <ul style="list-style-type: none"> <li>Definition, causes, diagnosis, and problems relative to CO</li> <li>Diet, exercise, and behavior modification</li> </ul> </li> <li>Keeping a record for food intake and exercise during an 8-week intervention period</li> <li>Watching a videotape regarding successful weight loss (34 minutes)</li> </ol>	<p>Once</p> <p>Once</p>	<ol style="list-style-type: none"> <li>Obesity guidelines for children</li> <li>Actions necessary for weight loss</li> </ol> <p>Weight record</p> <p>Videotape</p>

CO = childhood obesity.

**Post-test**

After the intervention period, self-control behavior, height, weight, obesity index, abdominal circumference, and body fat percentage were measured again in the two groups.

**Measures****Self-control behavior**

The definition of self-control behavior is the subjects' abilities at voluntarily controlling themselves without other people's help to promote their health and wellbeing (Webster's Dictionary, 2008). A 37-item instrument developed by the Incheon Metropolitan City Office of Education (2006) was modified and

utilized. The items could be grouped into two categories, self-control abilities about food, and exercise. This instrument was measured on a 5-point Likert scale, and a higher score meant a greater ability of self-control. A preliminary study of 70 children was conducted to explore the reliability of this instrument: they filled out this questionnaire, and six irrelevant items were deleted to obtain the highest level of reliability (Cronbach's  $\alpha = .82$ ).

**Obesity-related measures**

Obesity was measured using three methods. First, the obesity index was measured three times using the DS-102 extensometer, and the measurements

were averaged. The DS-102 extensometer automatically calculated obesity index based on a subject's height and weight. The following formulae were used: (a) weight / [(height – 100) × 0.9] × 100% for males; and (b) weight / [(height – 105) × 0.9] × 100% for females. Obesity levels were defined as follows: overweight (values of 110–120), mild obesity (values up to 130), moderate obesity (values up to 150), and severe obesity (values > 150) (Ministry of Health, Welfare and Family Affairs, 1992). Second, abdominal circumference was measured using a tape measure, and the mean of three measurements was calculated. Lastly, body fat percentage was calculated using the UM-021 produced by Tanita Corporation (Tokyo, Japan). This device was utilized because it produces more accurate results than a caliper (Jeon, 2003).

### Statistical analysis

SPSS version 11.0 (SPSS Inc., Chicago, IL, USA) for Windows was used. First, the normal distribution of

the outcomes was checked with the Shapiro-Wilk test. Second, homogeneity between the experimental and control groups were compared using a *t* test or a  $\chi^2$  test. Third, significant effects of the intervention on the four dependent variables (i.e., self-control behavior, obesity index, abdominal circumference, body fat percentage) were explored using analysis of covariance (ANCOVA) (Westfall, Tobias, Rom, Wolfinger, & Hochberg, 1999). In each ANCOVA, the post-test score was used as the outcome and the pre-test score was used as the covariate in order to control for differences in the pre-test (Jamieson, 2004).

## RESULTS

### Tests for homogeneity

Homogeneity in demographics between the experimental and control groups were tested (Table 2). First, there were no meaningful differences in gender,

Table 2

#### Homogeneity Test of General Characteristics in the Experimental and Control Groups

Characteristics	Experimental group (n = 32)	Control group (n = 33)	$\chi^2$ test/t test	p
Gender			0.032*	.857
Male	22 (68.8)	22 (66.7)		
Female	10 (31.3)	11 (33.3)		
Age (years)			0.127*	.938
11	12 (37.5)	13 (39.4)		
12	12 (37.5)	11 (33.3)		
13	8 (25.0)	9 (27.3)		
Breastfeeding history			0.665*	.415
Yes	6 (18.7)	9 (27.3)		
No	26 (81.3)	24 (72.7)		
Mother is employed			0.757*	.384
Yes	19 (59.4)	23 (69.7)		
No	13 (40.6)	10 (30.3)		
Parental obesity			0.376*	.540
Father	12 (37.5)	10 (30.3)		
Mother	20 (62.5)	23 (69.7)		
Children's height (cm)	149.63 ± 8.12	148.28 ± 7.17	0.714†	.478
Children's weight (kg)	60.21 ± 11.96	56.77 ± 9.40	1.293†	.201

Note. Values are n (%) or mean ± SD. \* $\chi^2$  test; †t test.

age, breastfeeding history, a mother's occupation, parental obesity, and the children's height and weight between the two groups.

Also, homogeneity of the outcomes (i.e., self-control behavior, obesity index, abdominal circumference, body fat percentage) was tested between the two groups (Table 3). These findings showed no significant differences.

### **Effects of the intervention on obesity-related outcomes**

#### **Self-control behavior**

Post-test values of self-control behavior were higher than pre-test values in the experimental and control groups. A difference score of 0.58 was obtained in the experimental group and this was significantly higher than the difference score of 0.09 in the control group (Table 4).

#### **BMI**

In both groups, post-test values of obesity index was lower than pre-test values. However, a difference

score of 5.81 in the experimental group was significantly higher than a difference score of 0.11 in the control group (Table 4).

#### **Abdominal circumference**

Abdominal circumference in the experimental group decreased from 86.33 cm at the pre-test to 83.62 cm at the post-test. In contrast, abdominal circumference in the control group increased from 84.34 cm at the pre-test to 84.88 cm at the post-test. Difference scores between the two groups were significantly different (Table 4).

#### **Body fat percentage**

In the experimental group, body fat percentage decreased from 32.77% at the pre-test to 31.67% at the post-test, while in the control group, body fat percentage increased from 32.73% at the pre-test to 35.18% at the post-test. The difference score of 1.1 in the experimental group was significantly different from the score of 2.45 in the control group (Table 4).

**Table 3**

*Homogeneity Test of Outcomes at the Pre-test in the Experimental and Control Groups*

Outcome	Experimental group (n = 32)	Control group (n = 33)	t test	p
Self-control behavior (score)	3.57 ± 0.43	3.67 ± 0.46	-0.968	.337
Obesity index (%)	139.56 ± 15.29	135.65 ± 11.89	1.152	.254
Abdominal circumference (cm)	86.33 ± 8.04	84.34 ± 6.31	1.111	.271
Body fat (%)	32.77 ± 4.09	32.73 ± 5.22	0.036	.972

Note. Values are mean ± SD.

**Table 4**

*Effects of the Weight Control Program Focusing on Maternal Education*

Outcome	Experimental group		Control group		ANCOVA (F)
	Pre-test	Post-test	Pre-test	Post-test	
Self-control behavior (score)	3.57 ± 0.43	4.15 ± 0.22	3.67 ± 0.46	3.76 ± 0.38	30.58*
Obesity index (%)	139.56 ± 15.29	133.75 ± 14.09	135.65 ± 11.89	135.54 ± 11.66	23.15*
Abdominal circumference (cm)	86.33 ± 8.04	83.62 ± 7.64	84.34 ± 6.31	84.88 ± 6.73	18.98*
Body fat (%)	32.77 ± 4.09	31.67 ± 4.47	32.73 ± 5.22	35.18 ± 5.62	60.96*

Note. Values are mean ± SD. \*p < .001.



## DISCUSSION

The most distinctive feature in this study was that the weight loss intervention was mainly provided to mothers rather than to obese children. Currently, there is a paucity of empirical studies examining the effect of mother-focused intervention. Although some studies included mothers as the recipients of the interventions, they mainly targeted obese children rather than their mothers (Joo, 1998; Kim & Kim, 1996; Kim, 2003; Lee, 2004; Sahota et al., 2001; Yoo et al., 1998). Thus, a direct comparison between this study and existing studies is limited.

One of the important findings in the current research is the strong effect of the weight control program on children's enhanced self-control. This program featured two approaches: one was that a child kept a daily record of food intake and exercise, and the other was that a child attached a list of recommended actions for weight loss to the refrigerator and followed them. One difference to consider here was that only children in the experimental group had support from their mothers in keeping a record and following the guidelines. The findings and the approaches used are in line with those in one intervention program targeting obese children and their mothers as the recipients (Lee, 2004). More specifically, the program developed by Lee mainly focused on cyber counseling, and also had the obese children post a diary about food and exercise on the website. These approaches were successful in increasing obese children's self-efficacy and self-control capabilities. Recording food and exercise in childhood is critical for children's weight control. Also, a mother's assistance had a synergistic effect on their child's self-control, demonstrating a greater increase in self-control in the experimental group than in the control group. It seems that these activities gave mothers and children the chance to look back on the amount of food eaten and exercise undertaken every day. In doing so, mothers and their children could have an opportunity to reflect on their lifestyle and could be more strongly motivated to change it and increase weight loss.

The other obesity-related outcomes were obesity index, abdominal circumference, and body fat percentage. First, obesity index was significantly lowered after the interventions were provided to the experimental group, and this is consistent with what was found with other interventions that included mothers as the recipients (Joo, 1998; Kim & Kim, 1996; Kim, 2003; Lee, 2004; Yoo et al., 1998). However, the effects of intervention programs differed in these studies. This could be attributable to a different study period, different measures of obesity, and different subjects.

Second, the average abdominal circumference was significantly reduced after the intervention was completed. Abdominal circumference was measured in this study, although the majority of previous studies used tricep skinfold thickness (Kim & Kim, 1996; Kim, 2003; Lee, 2004). This was done because Lee (1997) demonstrated that abdominal circumference is a valid measure of obesity.

Lastly, average body fat percentage was significantly lowered in the experimental group compared to the control group. This result is also consistent with previous studies (Kim, 2003; Lee, 2004). A measure of body fat percentage is considered useful and valid in diagnosing obesity, given that children can be overweight due to muscle and bone mass.

This study has three recommendations for clinical practice. First, due to the strong influences of maternal education on children's weight control, intervention programs that include both mothers and obese children are highly recommended. Second, in reality, it is not easy for investigators to have mothers attend the education sessions because most of them have a job. For instance, in this study, about 65% of the mothers were employed. Therefore, the utilization of other educational and counseling methods that are free from limitations of space and time should be developed. Third, in implementing a weight control program, emotional problems that obese children may suffer must be taken into account. Yoo et al. (1998) suggested that participants in a weight control program are highly likely to feel isolated, which can result in lowering of self-esteem. Subsequently,

they tend to drop out of the program. Considering these facts, it is necessary to develop a weight control program that can prevent obese children from suffering emotional problems (e.g., by using both non-obese and obese children as participants).

This study was subject to two limitations. First, although attempts were made as much as possible to preclude the dissemination problem, this study could not be fully free from this issue because: (a) the study was conducted in one elementary school; and (b) the children in the control group might have influenced their mothers. Second, since the sample was not randomly selected, the generalizability of the findings could be limited.

## CONCLUSION

This study explored the influences of a weight control program focusing on maternal education on their children's obesity. The current program enhanced obese children's self-control abilities regarding food and exercise and lowered their obesity levels. For future research, two issues need to be highlighted. First, further empirical evidence about the effects of maternal education on their children's obesity must be collected. Second, the length of time the influences of an intervention continue must be examined, given that obesity cannot be resolved within a short period.

## REFERENCES

- Ahn, J. M., & Park, J. Y. (2004). Effects of weight control program on weight, self-esteem, and body-consciousness in obese children. *Korea Sport Research*, 15, 439–452.
- Berk, L. E. (2000). *Child development*. Boston: Allyn and Macon.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Doak, C. M., Visscher, T. L. S., Renders, C. M., & Seidell, J. C. (2006). The prevention of overweight and obesity in children and adolescents: A review of interventions and programs. *Obesity Reviews*, 7, 111–136.
- Epstein, L. H., Wing, R. R., & Voloski, A. (1985). Childhood obesity. *Pediatric Clinics of North America*, 32, 363–379.
- Incheon Metropolitan City Office of Education. (2006). *Teacher's guideline for management of obesity in children and adolescents*. Incheon, Korea: Author.
- Jamieson, J. (2004). Analysis of covariance (ANCOVA) with difference scores. *International Journal of Psychophysiology*, 52, 277–283.
- Jeon, M. S. (2003). *The effects and development of the obesity control program for obese students in elementary school*. Unpublished master's thesis, Chonbuk National University, Jeonju, Korea.
- Joo, H. O. (1998). *Development of a weight control program for obese children*. Unpublished doctoral dissertation, Pusan National University, Busan, Korea.
- Kim, H. A., & Kim, E. K. (1996). A study on effects of a weight control program in obese children. *Korean Journal of Nutrition*, 29, 307–320.
- Kim, K. H. (2003). *The effects of the obesity control program connected with school nurse and parents*. Unpublished master's thesis, Keimyung University, Daegu, Korea.
- Korea Food & Drug Administration. (2005). *Childhood obesity, it is different from the others*. Retrieved April 17, 2008, from [http://www.kfda.go.kr/open\\_content/news/press\\_view.php?menucode=103004000&seq=736](http://www.kfda.go.kr/open_content/news/press_view.php?menucode=103004000&seq=736)
- Lee, D. H., & Park, J. K. (2006). *Making a healthy and strong body*. Seoul, Korea: National Health Insurance.
- Lee, E. J. (2004). *Effects of a weight control program with cyber counseling for obese children*. Unpublished doctoral dissertation, Keimyung University, Daegu, Korea.
- Lee, K. M. (1997). Correlation of body weight and fat mass reduction on body composition and blood lipids according to aerobic exercise in obese high school girls. *Journal of Kyung Nam Sports*, 2, 77–89.
- Ministry of Education, Science and Technology. (2007). *Results of health examinations among school-aged children and adolescents in 2006*. Seoul, Korea: Author.
- Ministry of Health, Welfare, and Family Affairs. (1992). *Healthy lifestyle*. Seoul: Author.
- Pietrobelli, A., Faith, M. S., Allison, D. B., Gallaghe, D., Chiumello, G., & Heymsfield, S. B. (1998). Body mass index as a measure of adiposity among children and



- adolescents: A validation study. *Journal of Pediatrics*, 132, 204–210.
- Rossner, S. (2001). Obesity through the ages of man. *International Journal of Obesity*, 25, S29–S33.
- Sahota, P., Rudolf, M. J., Dixey, R., Hill, A. J., Barth, J. H., & Cade, J. (2001). Randomized controlled trial of primary school based intervention to reduce risk factors for obesity. *British Medical Journal*, 323, 1029–1032.
- The Korean Pediatric Association. (2002). *The Korean child growth standard*. Retrieved April 21, 2008, from [http://www.leeheyoungh.co.kr/cms/cms\\_conts\\_view.asp?menu=1](http://www.leeheyoungh.co.kr/cms/cms_conts_view.asp?menu=1)
- Webster's dictionary (2008). *Webster's online dictionary*. Retrieved April 21, 2008, from <http://www.websters-online-dictionary.org/definition/self-control>
- Westfall, P. H., Tobias, R. D., Rom, D., Wolfinger, R. D., & Hochberg, Y. (1999). *Multiple comparisons and multiple tests using the SAS system*. Cary, NC: SAS.
- Yoo, I. Y., Lee, C. Y., & Lee, E. S. (1998). Effects of a weight control program for elementary school children. *Journal of Korean Society of School Health*, 11, 91–97.